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⑦① Applicant: **JAPAN EXLAN COMPANY, LTD.**, 2-8,
Dojimahama-2-chome Kita-ku, Osaka-shi
Osaka 530 (JP)

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⑦② Inventor: **Kobashi, Toshiyuki**, 1-6 Saldajji Kaml 3-chome,
Okayama (JP)
Inventor: **Naka, Hideo**, 794-14, Kanada, Okayama (JP)

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⑦④ Representative: **Bass, John Henton et al, REDDIE & GROSE** 16 Theobalds Road, London WC1X 8PL (GB)

⑤④ **Transparent aqueous tin compound solution and method of producing transparent conductive tin oxide.**

⑤⑦ By reacting a tin carboxylate with hydrogen peroxide at a particular ratio in an aqueous medium, this invention provides a transparent aqueous tin compound solution which can finally form, in an industrially advantageous manner, tin oxide having excellent transparency, uniformity, compactness, conductivity, etc.

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From the above Table, it is clearly understood that by following this invention, it is possible to provide a transparent aqueous tin compound solution which can form tin oxide having high compactness and exhibiting excellent conductivity.

On the other hand, to a 15 weight % aqueous solution of stannic chloride, an aqueous ammonium solution was added so that the pH of the solution became 8, thereby to produce colloidal stannic hydroxide. The colloidal stannic hydroxide was evaluated in the same way as above. The bulk density was 2.2 g/ml and the conductivity was 1,700 kΩ.

Example 2

Five kinds of transparent aqueous solutions (F-J) were produced in the same way as Example 1 (D) except that amounts of Sb_2O_3 shown in Table 2 below were added for one mol of $SnCl_4$. The values of the conductivity of these solutions were measured, and the results are shown in Table 2.

Table 2

Sample	F	G	H	I	J
Quantity of Sb_2O_3 added (mol)	0.005	0.03	0.05	0.25	0.35
Conductivity Ω	135	3	1	3	30

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It is understood from the above Table that by determining the quantity of H_2O_2 within the range of this invention, it is possible to improve the conductivity, and by adding a dopant the conductivity is remarkably elevated.

Example 4

Under various loads, measurement of bulk density and resistivity was made on Example 3 sample N and tin oxide conductive powder T-1 produced by Mitsubishi Metal Co.Ltd. The results are shown in Table 4.

Table 4

Load (t/cm ²)		1	2	3	4	5
Bulk density (g/ml)	Sample N	3.4	3.8	4.0	4.2	4.3
	T-1	2.2	2.7	3.3	3.9	4.3
Resistivity (Ω.cm)	Sample N	7×10^{-2}	4×10^{-2}	3.4×10^{-2}	3.2×10^{-2}	3.0×10^{-2}
	T-1	8×10^{-1}	7.5×10^{-1}	7×10^{-1}	7×10^{-1}	7.0×10^{-1}

It is clearly understood from the above Table that the product of this invention has excellent conductivity under every load.

Four kinds of tin oxide powder (O-R) were produced in the same way as Example 3 sample N except that the kind of dopant was varied.

The values of resistivity of these samples under the load of 1 t/cm² are shown in Table 6.

Table 6

Sample	S	T	U	V	W	X
Quantity of Sb ₂ O ₃ added (mol)	0.01	0.03	0.05	0.25	0.35	0.4
Resistivity (Ω .cm)	7x10 ⁻¹	1x10 ⁻¹	8x10 ⁻²	5x10 ¹	2x10 ²	3x10 ³

Example 7

The transparent aqueous solution (N) of Example 3 was spinner coated at 3,000 rpm onto a quartz glass substrate, and was calcinated in air at 700°C for two hours to produce a transparent conductive membrane.

The properties of the membrane are shown in Table 7.

Table 7

Membrane thickness (Å)	Percent transmittance (%)	Surface resistivity (Ω / □)	Membrane surface
300	90	200	smooth, uniform



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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
X	SU-A- 541 849 (T.F. DOBROXOTOVA) * Claims; column 1, lines 19-22; column 2, example 1; column 5, lines 26-34 *	1,3	C 03 C 17/23 C 03 C 17/25
Y	---	2,4	
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A	--- CHEMICAL ABSTRACTS, vol. 99, no. 20, 1983, page 129, abstract no. 160791f, Columbus, Ohio, US; & SU-A-1 033. 440 (V.P. KARLOV et al.) 07-08-1983 * Whole abstract *	1	
A	--- AU-A- 513 419 (MATSUSHITA) * Claim 1 *	1-4	C 03 C C 01 G

The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13-05-1987	Examiner BOUTRUCHE J.P.E.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			